SEA WASPS (SCYPHOZOA : CUBOMEDUSAE) IN THE NORTHERN TERRITORY

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The name 'sea wasp' is generally applied to a group of marine jellyfish responsible for severe and often fatal stings to bathers.

Members of the Class Scyphozoa occur around the Australian coastline and about thirty are recognised as stingers. Of these, the two most dangerous species are members of the Family Chirodropidae, Order Cubomedusae, namely *Chironex fleckeri* (Southcott) and *Chiropsalmus quadrigatus* (Haeckel). In addition, there are several generally smaller tropical species which can inflict very painful stings but are not responsible for fatalities. While both *Chironex* and *Chiropsalmus sp.* are present in waters of Northern Australia, only *Chironex fleckeri* has been confirmed as a killer in the Northern Territory. (Cleland and Southcott 1965).

The Cubomedusae are sometimes called box jellyfish due to their shape (fig. 1). They consist of a roughly cuboid bell of a tough gelatinous consistency which is almost transparent. This bell contains the digestive and reproductive functions as well as motive power. Each corner of the bell has a protruding pedalium branching into as many as twelve tentacles. (Southcott 1956, 1962; Barnes 1965).

The presence of the sea wasps during only six or less months of the year has been attributed primarily to the dietary requirements of the group. During the wet season, coastal waters are enriched by freshwater discharge from the land, carrying large organic loads. As a result of this, phytoplankton proliferates and is in turn grazed by small crustaceans, particularly the Sergestid shrimp *Acetes australis* (Colefax). It appears that *Chironex* in particular is well adapted to feed on this species. (See fig. 2)

On their arrival, many *Chironex* are small specimens (approx. 10-15 mm diam.) with a single tentacle on each corner of the bell. However, they grow rapidly and by February can reach 200 mm diameter with tentacles over 2 metres long. However, in contrast, large specimens have been observed early in the season and this, along with the virtual disappearance of the animals during the dry season, presents a rather confusing glimpse of the life history. Many members of the Class Scyphozoa have a dormant or sessile phase in their life cycle, including *Chironex* (Hartwick pers. comm.) but the details of the dry season whereabouts of this species have yet to be fully explained.

The feeding mechanism of the Cubomedusae is well adapted to its specific needs and it is this mechanism which is responsible for the severe stings. Each tentacle is lined with bands of stinging cells known as cnidoblasts. Within these cells are very efficient organoids or nematocysts (one per cell). These nematocysts are composed of a capsule of highly toxic venom, a barbed, finely coiled tube and a protruding trigger. When the trigger is stimulated by contact with food, it fires or discharges the tube with significant force (at least enough to penetrate the live prey) and the venom is then discharged down the tube. (Details of this action are provided in Southcott, and Cleland and Southcott.

Under natural circumstances, the prey would be a small shrimp or fish larvae and only a small number of nematocysts would be discharged. The extremely toxic venom is capable of stunning the prey, minimizing any struggles that could damage the relatively fragile body of the sea wasp. However, when bathers are stung, a great deal of tentacle contact occurs (see Maguire) and possibly thousands of nematocysts are discharged and inject their venom. Consequently, the severity of the sting depends to a great extent on the amount of tentacle contact, this obviously being less with smaller individuals.

There is some evidence to suggest that nematocysts discharge more readily in diluted sea water as there is a statistical correlation between massive and fatal stings and recent heavy rain. (Barnes 1966).

Most Cubomedusae are particularly sensitive to turbulence and they are generally found close inshore only on calm days. The group are all active swimmers, propulsion being achieved by muscular contractions of the bell expelling water. This swimming action is utilised during feeding — once the prey has been located and paralysed, it is transferred to the gastric region using gravity. The animal merely settles upside down and the tentacles fall within the bell where the food is removed.

The medusa then rises towards the surface and swims. After a short while, all activity is suspended and it gradually sinks until the tentacles encounter food, whereupon it repeats the operation (Barnes 1966).

The clinical effects on humans of the toxin released by *Chironex fleckeri* have been well documented by several authors, including Cleland

and Southcott (1965), Barnes (1976), Maguire (1968), Keen (1970) and Southcott (1974).

Detailed pharmacological studies of the toxin have been carried out by Endean et al (1969), Keen and Crone (1969), Freeman and Turner (1971), and many others. In brief, the effects of the toxin can be summarized into three categories: namely neurotoxic (lethal factor causing cardiac and respiratory arrest), dermatonecrotic (skin death) and haemolytic (destruction of red blood cells).

In the North of Australia, recorded sea wasp deaths easily outnumber those attributed to sharks, sea snakes and other dangerous marine creatures. The nature of the animal renders the chance of physical exclusion from swimming areas minimal. Many proposals for exclusion have been considered, but the safest way to avoid being stung is to avoid swimming in the sea during the wet season. Protective clothing is quite effective provided the trunk is adequately covered and the material thick enough to prevent nematocyst penetration.

Research is being conducted into a variety of treatments for stings. One handicap with antivenenes designed to be administered after a major sting, is that some training would be needed for correct administration and the victim may suffer cardiac arrest within 1 to 2 minutes of the attack. The chances of having the anti-venene and a qualified person close enough to be effective are fairly low, particularly in remote areas.

The structure of the active component in the toxin suggests a chemical antidote may be advised which can be administered via innoculation. While such an antidote could probably be prepared, the problems of testing it on humans and the possibility of its low effectiveness against toxins from other species have not been overcome.

First Aid treatment of victims of stings must be immediate, and medical attention is very important. The first concern is to prevent further nematocyst discharge by dehydrating adherent tentacles using methylated spirit or other alcohol. Removal of tentacles by gently peeling them off should be carried out, but on no account should they be rubbed or rolled across the body.

Further information is available from the local health authorities and in the literature cited, including Edmonds (1975?) and Anon (1975).

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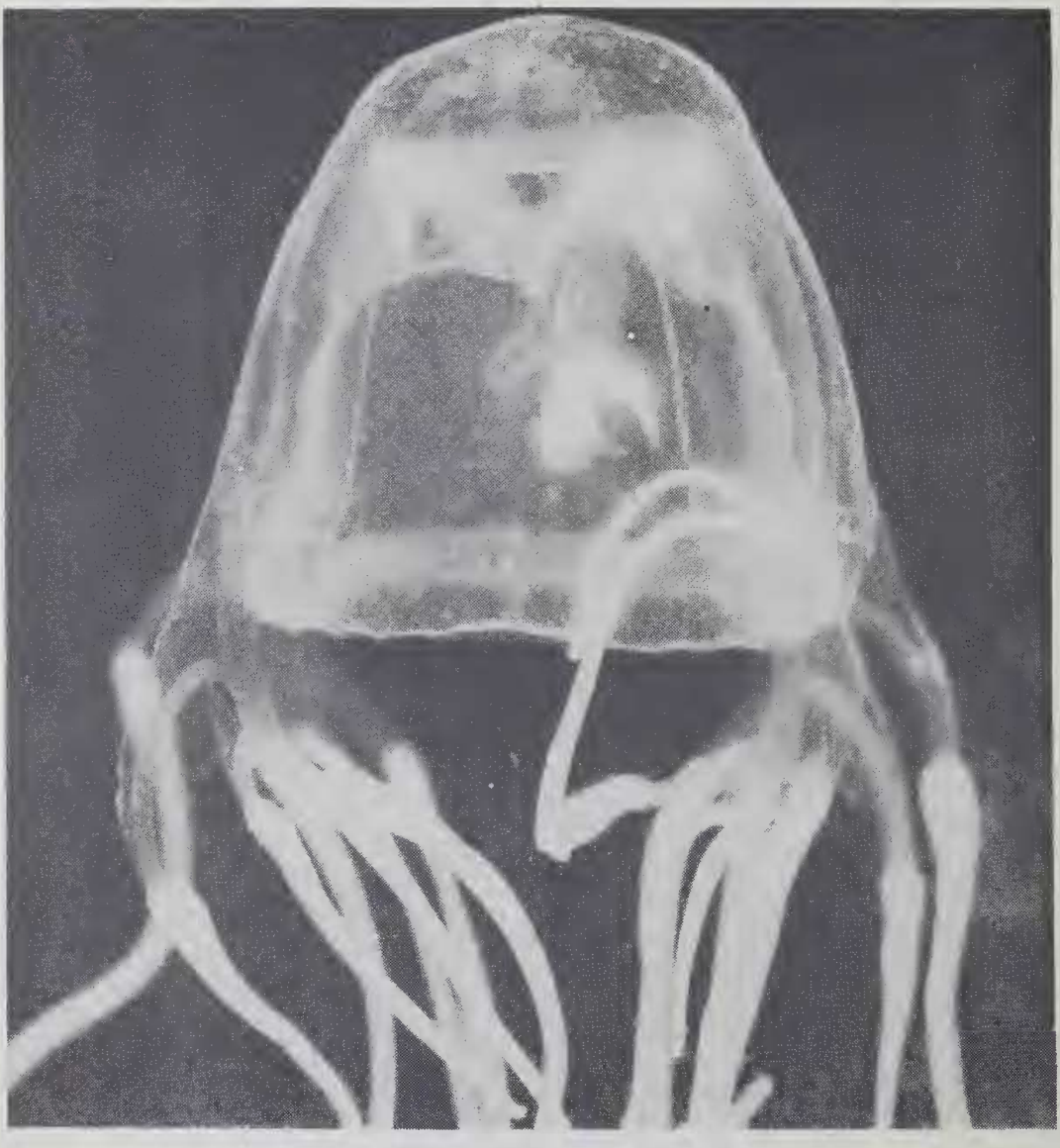

Fig. 2 *Chironex fleckeri* with partly digested *Acetes sp.*